

## APHIDIDAE IN AUSTRALIA II.

## Subtribe Pentaloniina.

By G. H. HARDY.

(Read before the Royal Society of Queensland, 26th August, 1940.)

## I. TAXONOMY.

*The status of the subtribe Pentaloniina.*—Under this subtribe proposed by Baker (1920), for which some authors find little justification, only three standing genera are now recognised, and it might even prove advantageous if all the species concerned were merged in one generic conception under the subtribe *Macrosiphina* Baker, as the characters are not clearly differentiated and most of those used are inconstant.

Key to species of the *Pentaloniina*.

1. Wings with the radial vein anastomosing with the median; stigma normal. Antennae with many sensoria on segments 3, 4 and 5 of the alate form. Cornicles constricted at about their centre on all instars . . . . . *Pentalonia nigronervosa* Coq.  
 Wings normally with the radial and median veins separated, but if anastomosing, then the stigma is unusually short. Antennae with sensoria absent on the fifth segment, or at most limited to two or three (except some forms not in Australia) . . . . . 2
2. Stigma normal. Antennae of the alate form with sensoria on segments 3 and 4. Cornicles slightly swollen over the apical half on all instars . . . . . *Idiopterus violae* Pergande
- Stigma unusually short. Antennae of alate form with sensoria on the third segment and absent or very scanty on the fourth. On all instars the cornicles vary with growth from strongly conical to cylindrical on the adult . . . *Idiopterus nephrolepidis* Davis

## Genus IDIOPTERUS Davis.

*Synonymy.*—Under this genus come *Fullawayella* Del Guercio 1911, *Neotoxoptera* Theobald 1915, and *Micromyzus* v.d. Goot 1917. Theobald based his genus on *violae* Pergande, the others using *nephrolepidis* Davis. Further species have been added under one generic name or another by Takihashi, Moreira, and Essig. Although Hottes and Frison 1931, unite *Idiopterus* and *Neotoxoptera* as a single genus, Essig 1935, would separate them. He considered that the name *Neotoxoptera* was invalid for his purpose and, moreover, did not recognise *M. nigrum* v.d. Goot as a synonym, thus placing *Micromyzus* as a name preferable to *Neotoxoptera*.

*Generic Status.*—The banana aphid *Pentalonia nigronervosa* Coq. is the only species in its genus, and there is little to show that *Idiopterus nephrolepidis* Davis is sufficiently distinct to make another valid genus. The former has one oblique vein (the median) in the hind wing, but this sometimes is missing, and the latter has one or two such veins, but both may be missing, and the character is similarly variable on *I. violae* Perg.

*Pentalonia* always seems to have the radial vein of the anterior wing fusing with the median beyond the first branch, and *Idiopterus* is variable in this respect, although according to published illustrations the radial may anastomose with the median before the first branch; I have found no Australian specimens with this character. On *I. nephrolepidis* Davis, the radial and median veins often lie close together beyond the first branch of the median, but generally they stand well apart, and are always situated widely apart on *I. violae* Perg. One specimen of the latter entirely misses the median vein in all four wings, whilst the hind-wing also misses the cubital, and there are many variations showing stages towards this extreme.

*Microparsus* Patch 1909 is based on characters that are included in the variations of species under *Idiopterus*, and the genotype being called *variabilis* Patch, further suggests that this rare monotypical North American genus is not valid. Hottes and Frison seem to be the only authors who have discovered it since Patch originally described the species, and they maintain it as distinct on characters that do not seem satisfactory in the light of the present discussion.

*Idiopterus* is accepted in this paper, covering two species in Australia with synonymy recorded below.

#### IDIOPTERUS NEPHROLEPIDIS Davis.

*Idiopterus nephrolepidis* Davis 1900, North America.

*Macrosiphum kirkaldyi* Fullaway 1910, Hawaii.

*Fullawayella kirkaldyi* Del Guercio 1910.

*Microsiphum nigrum* v.d. Goot 1917, Java.

*Host-plants*.—Various ferns.

*Distribution*.—The country of origin of this tropical insect is unknown, but it is now an uncommon to rare insect throughout most parts of the world, being transported with ferns, surviving in temperate regions in greenhouses.

*The First Record*.—The earliest reference to this aphid, is that of Buckton (1876) who, without naming the insect, states that "Professor Kaltenback considers that no aphides attack the Felices or ferns, but the family is not wholly exempt, for I have found, in a greenhouse, a new species which clusters on a foreign *Cystopteris*." One of these specimens is mentioned by Theobald (1926, p. 360), for, referring to the occurrence in England, he states that "it is evidently not a recent introduction for Laing finds a slide of it in Buckton's collection." This record adds another genus of fern to those already in the host-plant lists.

#### IDIOPTERUS VIOLAE Pergande.

*Macrosiphum violae* Pergande 1900, North America.

*Neotoxoptera violae* Theobald 1915, South Africa.

*Fullawayella violae* Baker 1919.

*Idiopterus violae* Hottes and Frison 1931.

*Micromyzus violae* Essig 1915.

*Host-plant*.—*Viola*.

This aphid is recorded from many parts of the world and its country of origin is not known. So far it has been recorded only from cultivated violets, and I failed to find it on the native violet which grows very densely in an area about fifteen miles from Brisbane. It seems to be generally scarce. Perhaps records of *I. nephrolepidis* Davis, breeding on violets, is a misidentification of this species. I have failed to interchange the host-plant of these two.

As stated in the prior paper (Hardy 1931), this species has only been found in Brisbane during the three winter months from June to August, but it seems probable that May is the month when the colonies are started. Parasitic and predaceous insects have not been found associated with them, presumably because the season of the year associated with the shady conditions under which the host-plant occurred are unfavourable for parasitism.

## II. BIOLOGY.

*Pentalonia nigronervosa* Coq.—In Brisbane, within each colony, several generations of apterae are reared before the alate forms are produced. These alate migrants first appear in the spring month of September, or even late August, but are few in numbers, and each colony producing migrants dies out soon afterwards. Other colonies existing at the same time, but which do not produce alatae then, do so in November and in more noticeable numbers. These also peter out, leaving behind those started in the early spring by the September migrants. The latter produce their alatae in December and January before they, too, die out.

It is the colonies initiated in November that are responsible for the alatae which appear with remarkable suddenness, in considerable numbers, in March-April. Chiefly at this time of the year, migrants swarm over the many plants, mainly monocotyledons, setting up new colonies, as already reported (Hardy 1931).

New colonies are established by migrants reared after a long series of apterae are produced, and if migrants be produced before the normal time, either these fail to initiate new colonies, or do so to a very limited extent. There are consequently four periods of the year when migrants are produced on a sufficiently large scale to be apparent. Each colony seems to run through seven to ten generations before producing alatae forms, and each of the apterae give rise to about two young per day over a period that does not seem to differ from that of other *Pentalonina*.

Breeding records of *Idiopterus nephrolepidis* Davis give a better idea of what actually happens in the life-cycle. This aphid has been observed only in the autumn and winter months, and the production of alatae is followed by the extinction of the colony just as with *P. nigronervosa*. This is not entirely due to the predaceous and parasitic insects which are plentiful at this period of the year. Colonies kept entirely free from attack by their natural enemies failed to survive production of more than a few successive generations of migrants, the species surviving only for about twelve weeks. In England, Theobald (1926) found alatae produced about five times in the year under greenhouse conditions, and this allows 5 or 6 apterae generations to occur between alatae.

*Idiopterus violae* Pergande is found in winter; about June the alatae seem to be reared continuously for a short period and the colonies entirely disappear in August. Apparently not more than two apterae generations occur between alatae. For a time it seemed probable that violets were being infested from the adjacent *I. nephrolepidis*, very much as the banana aphid *P. nigronverosa* which attacks *Caladiums* produced thereby the form known as *P. caladii* v.d. Goot. However, several attempts to interchange the host-plants of *I. nephrolepidis* and *I. violae*, were unsuccessful.

#### BREEDING EXPERIMENTS.

On March 13th, 1929, a migrant *I. nephrolepidis* arrived on a fern *Platycerium*, and this was transferred to a similar fern in the glass-house. Data was secured by counting the progeny and recording the dates, one of the specimens being transferred to a third fern, and each subsequent generation was similarly treated.

*1st Generation.*—March 15th, 2; 18th, 12; 19th, 13; 20th, 17; 21st 17; 22nd, 18; 25th, 22; 26th, 28; 27th, 30; 28th, 32; April 2nd, 40; 3rd, 40; 5th, 42, parent dead.

Over a period of twenty-two days, 42 young were born, averaging about two young per day. On March 26th one aphid was transferred to another fern, the remainder being destroyed before reproducing. Fourteen days elapsed between birth and reproduction by this first generation.

*2nd Generation.*—The aphid transferred on March 26th to the third fern had the following issue:—March 28th, 2; April 2nd, 13; 3rd, 19; 5th, 21; 8th, 24; 9th, 24. The parent then disappeared, having yielded twenty-four young in thirteen days.

Two aphides of the first generation, reared in the open, were then transferred to a fourth plant in the glasshouse on May 12th, these yielding—May 14th, 6; 15th, 10; 17th, 15; 20th, 21; 22nd, 27; 24th, 33.

Thirty-three young in eleven days, gave for each of these two about  $1\frac{1}{2}$  average per day. This count in colony again was never completed, because the next observations were made on May 27th, when the progeny had started producing the third generation, showing about fourteen days passed between birth and reproduction.

*3rd Generation.*—June 7th, 1; 12th, 4; 14th, 4; 17th, 5; 20th, 9; 24th, 10; 26th, 11; July 1st, 13; 4th, 16; 6th, 16.

Reproduction ceased after July 4th, giving 16 young produced in thirty-eight days during mid-winter, an average less than one in two days. Two of these young aphides were transferred to another fern, but failed to survive. The whole stock of these aphides died without apparent cause, and a fourth generation was not detected breeding anywhere in the several colonies under observation whilst these tests were in progress.

*A Mass Production Test.*—The following year, an alate aphid was brought into the glasshouse and allowed to produce in quantity. The colony started on March 14th, 1930, with the following issue:—March 17th, 4; 19th, 8; 20th, 9; beyond which further counts were not kept.

On April 22nd, three winged aphides were reared. Two generations of the apterae were bred in the five weeks before producing the alatae. Eventually this free-breeding stock petered out in the winter and the remaining alatae did not initiate any new colonies.

It would seem that colonies do not normally survive the Brisbane winter and temperatures may have much to do with this. The species is very heavily preyed upon by predaceous insects of several kinds, Syrphid and Neuropterous larvae being the most abundant. Colonies are quickly wiped out by this means.

#### LITERATURE.

- BAKER, A. C. (1920). U.S. Dept. Agric. Bull. 826, 89 pp.  
BUCKTON, G. R. (1876). A Monograph of British Aphides, vol. 1, 190 pp.  
ESSIG, E. O. (1935). Pan-Pacific Entomologist, xi., pp. 156-162.  
HARDY, G. H. (1931). Proc. Roy. Soc. Queensland, xliii., pp. 31-6.  
HOTTES, F. C., and FRISON, T. H. (1931). Bull. Nat. Hist. Survey, Illinois, xix., pp. 123-447.  
MOREIRA, S. (1925). Inst. Biol. Defesa Agric. Bull. 2, p. 26.  
TAKAHASHI, R. (1931). Dept. Agric., Formosa, Rep. 53, 127 pp.  
THEOBALD, F. V. (1926). Plant Lice or Aphididae of Great Britain, vol. 1, 372 pp.
-